Internal Correspondence

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JUN 30 1986

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MARTIN MARIETTA ENERGY SYSTEMS, INC.

June 30, 1986

T. E. Myrick

Executive Summary of the 1985 Streambed Contaminant Survey (WOC & T)

I have enclosed five copies of letter report RAP86-47, which meets Remedial Action Program milestone 10.19. This letter report indicates that WAGs 1-9 should be included as part of the proposed RI/FS work to be initiated in FY 1987. The important things to note include the identification of the main plant area as the WAG with the highest release rate, and the first indications of a possible release problem in the eastern part of SWSA 6. It is also noteworthy that apparent decreases in release rates between 1978 and 1985 were seen near Pits 2-4, in the western part of SWSA 6 and at MSRE and SWSA 3.

The annual report by Cerling, which is due in July, includes an updated summary of his quarterly reports and the detailed information to back up the statements made in the enclosed letter report. I expect a similar analysis of the WAGs not covered here will be initiated this summer.

If you have questions or additional needs, please call.

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RAP86-47

1985 WHITE OAK CREEK AND TRIBUTARIES STREAMBED CONTAMINANT SURVEY

T.E. Cerling and D.D. Huff

Introduction

The objectives of the streambed contaminant survey reported here were to provide a basis for ranking corrective measures projects and to facilitate identification of sites where further studies are needed to characterize contaminant migration. Although the regulatory directives have shifted from CERCLA to RCRA, and emphasis is currently on investigation of continuing releases, the objectives are still valid. The information presented here is drawn from quarterly progress reports and a previously issued letter report that provides a relative ranking of the magnitude of fluxes associated with radionuclide sources that have been identified. Briefly, this report includes a summary of the active and inactive sources of radionuclides in 1985, recommendations on waste area groupings (WAGs) that clearly will require remedial investigation/feasibility studies (RI/FS) projects under RCRA 3004(u) provisions, and a ranking for WAGs that is based upon magnitude of releases observed for the July - August, 1985 period. An important assumption is that presence of radionuclide migration is indicative of general contaminant releases.

Active and Inactive Sources

The scope of the 1985 streambed contaminant survey has been confined to White Oak Creek, Melton Branch, and major tributaries to those streams. The work was patterned after a study that was conducted in 1978 (Cerling and Spalding, 1981) and provides a basis for comparison that reflects changes during the intervening period. The sites that have been investigated are shown in Figure 1, which portrays the White Oak Creek drainage system and locations of selected waste disposal areas. These sites were chosen to replicate a subset of those sampled in 1978. Active sources were defined using streambed gravels that were suspended in the flowing water to accumulate radionuclides and other contaminants by sorption. Sites 1-17 in Figure 1 were studied for active contamination (other sites were sampled for passive accumulation). In order to evaluate the active sources of contamination with respect to sites under consideration for continuing releases [RCRA 3004(u)], the WAGs associated with the various sites are as follows (beginning from upstream areas and progressing toward White Oak Dam):

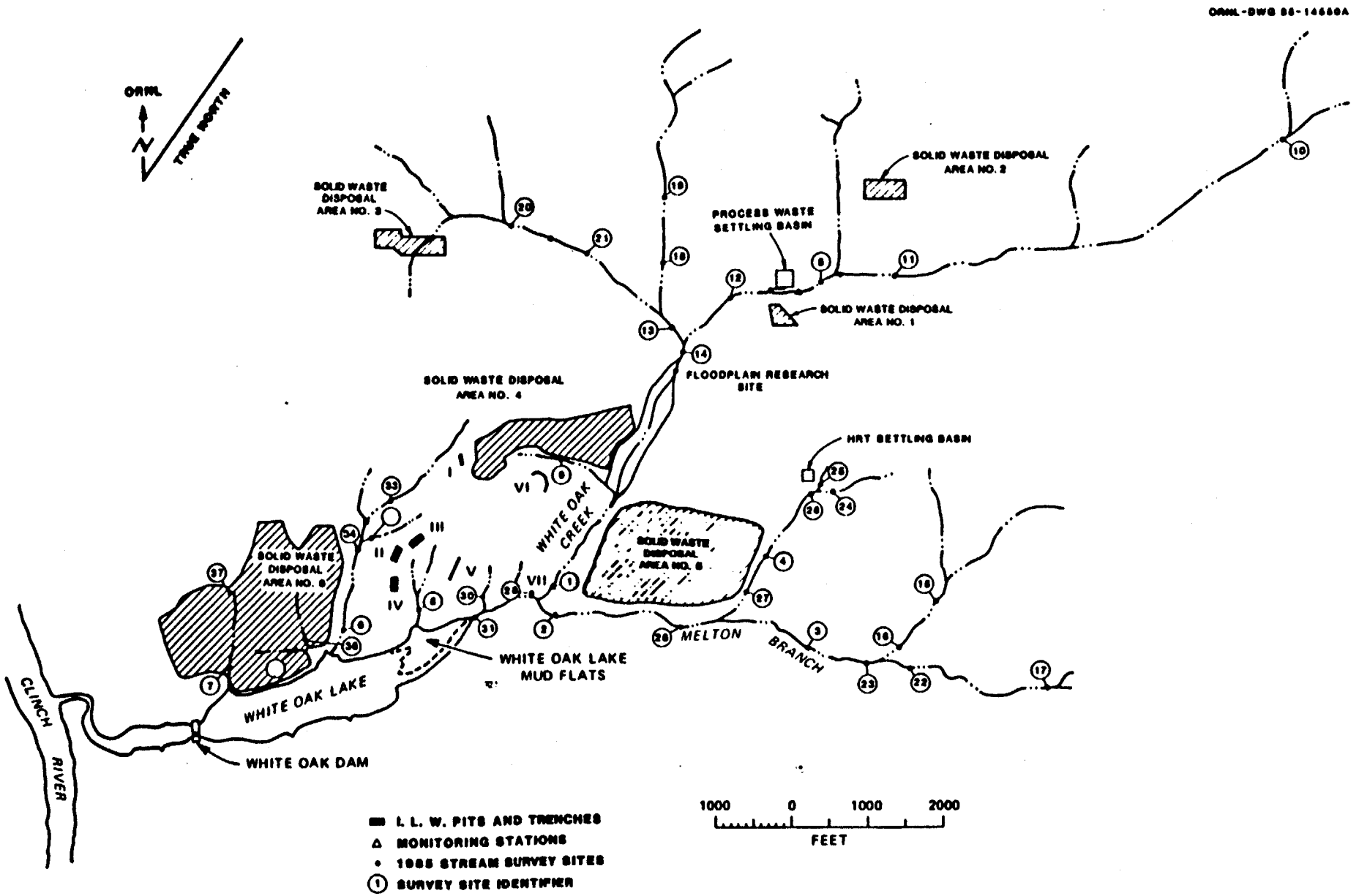

Figure 1. Streambed contaminant survey sampling sites

WAG	Stream Monitoring Sites
1. Main Plant Area	8, 10-12, 14
3. SWSA-3	13
4. SWSA-4	9
5. SWSA-5	1, 2
8. Melton Valley Area	3, 15-17
9. Homogeneous Reactor Experiment Area	4
7. LLW Pits and Trenches Area	5, 6
6. SWSA-6	7

An evaluation of radionuclide data shows that the main plant area (WAG 1) has active release of ^{60}Co, ^{137}Cs, and ^{90}Sr. There is evidence of input to both Fifth Creek and First Creek as well as to White Oak Creek. The process waste treatment plant was apparently a major contributor during the sampling period, but there is no question that the main plant area has other active sources of continuing release.

SWSA 3 (WAG 3) cannot be evaluated effectively for active sources. The site that was selected for active release monitoring (13) also includes inflow from First Creek. It is clear that a new source of active ^{90}Sr contamination to First Creek is present now that was not evident in 1978. Examination of streambed contents closer to SWSA 3 show presence of ^{90}Sr contamination, but suggest that SWSA 3 releases have declined since 1978. Thus, since there may still be ongoing ^{90}Sr releases from the SWSA 3 area, further study is warranted to accurately determine the nature and extent of continuing releases.

SWSA 4 (WAG 4) is still an active source for ^{90}Sr and ^{137}Cs releases. There is good evidence that ^{90}Sr releases have been effectively reduced by a surface water diversion (Melroy and Huff, 1985), but there is also evidence that continuing release sources still exist and will require stabilization (Melroy et al., 1986).

SWSA 5 (WAG 5) releases can be evaluated by examination of results at sites 2, 3, and 4. There is clear evidence of increased ^{90}Sr flux in Melton Branch to the south of SWSA 5; thus, it must be considered a source of continuing release.

The Melton Valley Area (8) can be assessed by examining active flux measurements at sites 3, 15, and 16. There is clear evidence of a ^{60}Co release, probably associated with HFIR operations. In addition, zinc and chromium are found at elevated levels downstream of HFIR. Thus, the Melton Valley WAG will require RI/FS work.

The Homogeneous Reactor Experiment Area (9) was assessed for active releases, using data collected at site 4 on Figure 1. This site shows active contamination for ^{90}Sr and ^{137}Cs, and thus the WAG requires investigation as a continuing release site.

The LLW Pits and Trenches area has been examined for active releases at two sites, 5 and 6. There is evidence of minor active movement of ^{60}Co and ^{90}Sr, which may be more related to redistribution of contaminants within the streambed and sediments than any active input. Because of the large inventory of potential contaminants present and convincing evidence of passive contamination present, the Pits and Trenches WAG (7) will require additional investigation.

SWSA 6 (WAG 6) is a site of ongoing detailed investigations. There is some evidence of active ^{90}Sr discharge from SWSA 6, although it appears that corrective measures above site 7 (Figure 1) have caused a significant decrease in releases since the 1978 survey. This WAG will require continued investigation.

Inactive sources of contamination include those where radionuclides have migrated beyond the original point of disposal, but may not have contributed to significant active discharges during the study. The WAGs in this category include SWSA 3 and the Pits and Trenches Area, where remedial actions began in the late 1970's. These sites will require ongoing monitoring for continuing releases, since the potential for migration still exists.

Examination of changes in radionuclide content of streambed materials between 1978 and 1985 can be used to indicate areas where corrective measures have exhibited apparent success, and to highlight any new sources. In addition, absolute amounts of radionuclides present are indicators of the relative magnitude of various sources in the basin. It is noteworthy that contaminant levels declined by a factor of 3 to 4 in the vicinity of the pits and trenches, and this probably reflects the effectiveness of the asphalt caps that were installed about 1980. At SWSA 6, the tributary draining the 49-trench area that has been sealed and had a french drain installed for groundwater control, has shown a 3-fold decrease in ^{90}Sr content in the streambed. This is also likely to be a consequence of the corrective measures taken. Other sites that have shown a substantial decrease in streambed contamination are the MSRE site and SWSA 3.

Two sites of new contamination were suggested by the data. There was over an order of magnitude increase in ^{90}Sr in First Creek, near site 18 in Figure 1. It appears that this new source originates in the main plant area. Studies to evaluate possible migration from SWSA 3, using dye tracers, did not show any indication of hydraulic connection. Further, sampling of

two outfalls (341 and 342) from the plant area into First Creek showed elevated beta contamination, which is probably ^{90}Sr. The other site with increased radionuclide content in stream gravel is the eastern drainage in SWSA 6. Both ^{60}Co and ^{137}Cs were observed at an order of magnitude higher levels in 1985. This does not prove that there is a growing release, but it does suggest that more detailed investigations are in order.

Priorities for Studies for WAGs

All of the WAG Sites listed have some evidence of continuing release of radionuclides. It has been assumed that this can be taken as evidence of release of other possible contaminants; thus, all sites listed in the table on page 2 of this report will require an RI/FS study. In addition, the White Oak Lake and White Oak Creek WAG (2) will also require an RI/FS study, since there is ample evidence that the WAG has become contaminated by discharges from other WAGs. Thus, WAGs 1-9 have all been confirmed as requiring an RI/FS on the basis of the streambed contaminant survey conducted to-date.

A combination of observed concentrations and flow rates has been used to estimate relative fluxes of contaminants associated with the various WAGs. The results were reported in RAP86-39, a letter report by D. D. Huff (April 28, 1986). The conclusions of that analysis leads to the following suggested priorities for RI/FS tasks, based upon observed active contaminant release rates:

WASTE AREA GROUPINGS

Number	Identifier	Priority
1	Main Plant Area	Higher
8	Melton Valley Area	Higher
5	SWSA 5	Medium
4	SWSA 4	Medium
9	Homogeneous Reactor Experiment Area	Medium
6	SWSA 6	Lower
3	SWSA 3	Lower
7	LLW Pits and Trenches Area	Lower
2	White Oak Creek/White Oak Lake	Lower

There are other factors that must be weighed, but the priorities listed above come from observed measures of discharge of radionuclides during the July-August 1985 survey.

References Cited

Cerling, T. E. and B. P. Spalding. 1981. Areal distribution of ^{60}Co, ^{137}Cs, and ^{90}Sr in streambed gravels of White Oak Creek Watershed, Oak Ridge, Tennessee. ORNL/TM-7318. Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Melroy, L. A. and D. D. Huff. 1985. Annual reduction of ^{90}Sr migration from Solid Waste Storage Area 4 to White Oak Creek by flow diversion. ORNL/TM-9620. Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Melroy, L. A., D. D. Huff, and N. D. Farrow. 1986. Characterization of the near-surface radionuclide contamination associated with the bathtub effect at Solid Waste Storage Area 4, Oak Ridge National Laboratory, Tennessee. ORNL/TM-10043. Oak Ridge National Laboratory, Oak Ridge, Tennessee.